lamp gives 22 candle-power with an energy consumption of 1·7 watt per candle-power, or about half that required by the ordinary incandescent lamp. The weight of a single filament is 0·022 gram, so that 1 kilogram of metal would be sufficient for 45,000 such lamps.

Whether it will be possible to obtain sufficient mineral to produce tantalum on a really large scale remains to be seen, because if it is possible there should be hardly an end to the usefulness of this metal, which possesses the properties ductility and hardness in such an extraordinary degree, leaving entirely out of question its employment in electric lamps.

F. MOLLWO PERKIN.

PRIMITIVE WATER-SUPPLY.[1]

THE mighty earthworks that still crown so many of our hills fill the archæologist alike with wonder and despair—wonder that prehistoric man, with the most primitive tools, was equal to the task of raising them, and despair that so little can ever be known about them, despite the most laborious and costly excavation. Plenty of books, however, of the kind now under notice would do much to solve the mystery and increase our admiration for Neolithic man, for it is to the period before bronze was known in Britain that the authors assign the stupendous works of Cissbury and Chanctonbury on the South Downs.

This is an open-air book that gives life to the dry bones of archæology, and reads like the record of a well-spent holiday. A keen eye for country is one of the qualifications possessed by one or both the authors, and evidence of ramparts long since levelled is wrung from the very daisies as they grow. The construction of dew-ponds by the early inhabitants of Britain has often been glibly asserted, but few, if any, have furnished such clear and circumstantial evidence as the authors of this short treatise. The water-supply for the occupants of our huge prehistoric "camps" has always been somewhat of a mystery, and it has been suggested that they were only temporary refuges, when the country was "up," so that a permanent supply was not regarded as a necessity. But the watering of men and animals on the scale indicated by the areas enclosed would be a formidable task even for a day, and another explanation must be sought. The late General Pitt-Rivers, for example, held that the water-level of the combes was higher then than now, and streams would have been plentiful on the slopes; but, feeling the inadequacy of this view, he also had recourse to the dew-pond theory. To those familiar with the process, this might seem an obvious expedient, but the interesting account given of the formation of such reservoirs might make us chary of crediting prehistoric man with such scientific methods.

An exposed position innocent of springs was selected, and straw or some other non-conductor of heat spread over the hollowed surface. This was next covered with a thick layer of well puddled clay, which was closely strewn with stones. The pond would gradually fill, and provide a constant supply of pure water, due to condensation during the night of the warm, moist air from the ground on the surface of the cold clay. Evaporation during the day is less rapid than this condensation, and the only danger is that the straw should be sodden by leakage. It is for this reason that springs or drainage from higher ground are avoided, as running water would cut into the clay crust.

Some ponds of this kind, no doubt of very early and perhaps of Neolithic date, may still be seen in working order: others are of modern construction; but to and from the ancient dew-ponds (or their sites) can sometimes be traced the hillside tracks along which the herds were driven, one leading from the camp, or cattle-enclosure hard by, to the watering-place, another leading back, to avoid confusion on the road. These and other details as to guard-houses and posts of observation are brought to our notice in the description of selected strongholds in Sussex and Dorset; and verification, if, indeed, such is demanded, must be sought on the spot by any who have doubts or rival theories.

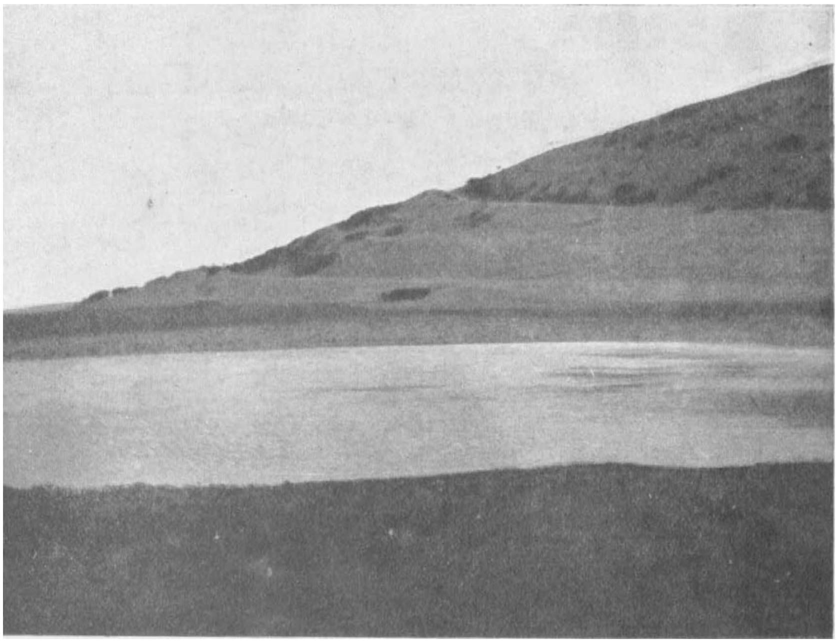

FIG. 1.—Cattle-ways leading down to Dew-pond at the North of Cissbury Ring. From Hubbards "Neolithic Dew-ponds and Cattle-ways."

The banks, that enclosed pasture-areas sometimes of vast extent, were no doubt stockaded against man and beast, and may be compared with the base-court defences of the Norman burh; but the excavator of Wansdyke had an alternative theory that such banks were sometimes erected for driving game. Incidentally, the authors discountenance the view that the "camps," not to mention the outworks, were ever efficiently manned. Their extent would necessitate for this duty a vast number of fighting men within call.

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[1] "Neolithic Dew-ponds and Cattle-ways." By A. J. Hubbard and G. Hubbard. Pp. x+69; illustrated. (London: Longmans, Green and Co., 1905.) Price 3s. 6d. net.

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Possibly, in a few instances, the ridges on the hill-slopes may be due to outcropping strata, and others might suggest terrace-cultivation; but there seems ample evidence for the view taken that Neolithic cattle-tracks have survived to this day around certain of our most imposing "camps."

Failing large-scale maps, a sketch-plan of the earthworks noticed would have made the description even more illuminating; but the only matters of complaint are that the book is all too short, and that the paper selected to throw up the detail of the photographs is as chalky as the Downs they illustrate so pleasantly.

HENRY BENEDICT MEDLICOTT, F.R.S.

ON April 6 there passed away one of the few survivors amongst the small body of men who laid the foundations of Indian geology. Despite much excellent work, chiefly by non-professional men, very little was really known of the geology of India, and especially of Peninsular India, before the middle of the nineteenth century, and as one instance amongst many, the Vindhyans, now believed to be Archæan, were still classed with Gondwana Permo-Carboniferous strata, and both were regarded as of Jurassic age. A comparison of Dr. Carter's "Summary of the Geology of India between the Ganges, the Indus and Cape Comorin," published in 1853, with the "Manual of the Geology of India," issued in 1879, will show the great improvement that took place in the meantime in our knowledge of the country.

In this change none had a larger share than Henry Benedict Medlicott. Born in Loughrea, county Galway, he was the second of three sons of the Rev. Samuel Medlicott, rector of Loughrea, and of Charlotte, the daughter of Colonel H. B. Dolphin, C.B. All three sons were men of great intellectual capacity and of marked originality. The eldest, J. G. Medlicott, became a member of the Geological Survey of India before his brother joined; he was subsequently in the Indian Educational Service, and died in 1866. The third brother, Samuel, was a clergyman, who has also been dead several years. The subject of the present memoir was educated at Trinity College, Dublin, and, after taking his degree, was for a short time on the staff, first of the Irish, then of the English Geological Survey. In the spring of 1853 he joined the Geological Survey of India under the late Dr. Thomas Oldham, but was almost immediately appointed professor of geology at the Roorkee College of Civil Engineering, an appointment which he held until 1862, when, on some additions being made to the staff, he re-joined the Geological Survey of India, and was made deputy superintendent for Bengal.

But during his tenure of the Roorkee post he spent part of the year surveying for the Geological Survey, and in his first season's work he and his brother made a primary step towards the elucidation of Indian geological history by separating the ancient Vindhyans north of the Son and Nerbudda Rivers from the Indian Coal-measures and their allies to the southward. In subsequent years, whilst his brother mapped the last named strata, he surveyed the older Vindhyans and their associates, and to him we owe our first recognition of the Bijawur and other ancient rocks between the old gneissic formation and the Vindhyans. In other years he explored the Himalayas, and the ranges at their base, between the Ganges and the Ravi, and he drew up the description of the older unfossiliferous beds of the mountains, and of the Tertiary and other strata fringing their base, which was published in the third volume of the Indian *Memoirs*. This contains a sketch of the history of the Himalayas which has been generally accepted ever since.

After returning to the survey in 1862 (he always protested that he really had remained a member of the staff throughout), he examined in successive years the greater part of northern India. Various tracts of the Himalayas from the Punjab to Assam, the Assam valley and the hill ranges south of it, and, in the Peninsula, Rajputana, Nimar, the Nerbudda valley and Satpura ranges, Bundelkhand, South Rewah, Chhatisgarh and Sambalpur, Chota Nagpore, Hazaribagh, and Behar were visited and reported upon in turn.

Dr. Oldham retired in 1876, and Mr. Medlicott succeeded him as superintendent, a title subsequently changed to director of the survey. The first work undertaken by him as superintendent was a general account of Indian geology. This had long been urgent, and would probably have been written by Dr. Oldham but for failing health. The "Manual of the Geology of India" was published in 1879, and a very large portion, including the account of the Azoic rocks from gneiss to Vindhyans (which between them cover the greater part of the Indian peninsula), and of the geology of the Himalayas and sub-Himalayas, in fact, nearly half the entire work, was written by Mr. Medlicott himself. In many ways a great impulse was given to survey work by the new superintendent. As regards publication alone, the volumes of the *Records* from 1877 are doubled in bulk when compared with previous issues, and these volumes, containing accounts of recent geological observations, both economical and scientific, represent the actual field work of the survey to a larger extent than the longer memoirs and palæontologia.

Throughout his career as head of the survey Mr. Medlicott adopted a most liberal policy of publication. He allowed his staff to report on their own work freely, and whilst assisting them in every way, both in the field and in the study, he never took any of the credit of their work. Not only did he welcome reports from the geologists of the survey, but he published, whenever possible, contributions from independent observers. In this manner he secured the valuable assistance of the late General McMahon, the whole of whose most important observations on the physical history of the Himalayas appeared in the *Records* of the Geological Survey of India.

Modest and retiring, he was nevertheless a man of high courage and independence. One trait of this was shown in the Indian Mutiny, when, with one companion, despite the mutiny of the guard that should have accompanied them, he saved the lives of a Christian family who had fallen into the hands of the rebels, a most gallant action, the account of which is due to Colonel Baird Smith, the head of Roorkee College and the commanding officer. After retiring from the Indian Survey in 1887, he lived very quietly at Clifton, devoting himself to philosophical problems. He published a couple of short pamphlets on "Agnosticism and Faith" in 1888, and on "The Evolution of Mind in Man," but a larger work on which he was engaged is, it must be feared, incomplete. A strain caused by bicycling led to serious heart symptoms some years ago, and although a partial recovery was made, a relapse about a year since reduced him so much that it was not surprising to hear that he passed quietly away on April 6, whilst seated in his study.

Mr. Medlicott became a Fellow of the Geological Society as long since as 1856, and in 1888, on his retirement from India, he received the Wollaston

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